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ABSTRACT

Using 1968 data collected from junior and senior high school students in Bayamon, Puerto Rico, substance usage patterns for heroin and alcohol were predicted for 1975-6. A sample of 1,000 of the initial 5,000 students were selected for re-interview; half were selected to be at high risk of substance abuse and half were selected randomly. Some 657 young people were interviewed, and 130 parents were interviewed when the target young person was unavailable. A 17% prediction of the variance in heroin usage and 33% of the variance in alcohol usage were possible. Two quite different predictive patterns appeared. For the later heroin user, academic failure was the major predictor. Later heroin users tended not to be bothered by nervousness, not anxious about tests, to have parents who generally did not know what they were doing, and to be reserved rather than outgoing in their personality. Other variables predicting heroin usage were poverty, early money-earning, possible deafness, and a rural background. The later heavy alcohol user was most likely male, low on social desirability traits, and low on conscientiousness, but tending to be enthusiastic. Parents tended not to know what their child was doing, and academic achievement was lower than average. (Author/CKJ)

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# PREDICTING HEROIN AND ALCOHOL USAGE AMONG YOUNG PUERTO RICANS

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# PREDICTING HEROIN AND ALCOHOL USAGE AMONG YOUNG PUERTO RICANS [1]

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## ABSTRACT

Using data collected from junior and senior high school students in Bayamón, Puerto Rico in 1968, their substance usage patterns obtained in interviews in 1975-76 were predicted. A sample of 1,000 of the initial 5,000 students were selected for re-interview, half were selected to be at high risk of substance abuse and half were selected randomly. Some 657 young people were interviewed and another 130 parents were interviewed when the target young person was unavailable.

It was found possible to predict 17 percent of the variance in heroin usage and 33 percent of the variance in alcohol usage. Two quite different predictive patterns appeared. For the later heroin user, academic failure was a major predictor, with heroin users being characterized by very major early academic failures. Students who later became heroin users tended not to be bothered by nervousness, were not anxious about tests, and tended to have parents who generally did not know what their child was doing. The students who later became heroin users also tended to be reserved rather than outgoing in their personality. Other variables predicting heroin usage were poverty, starting at an early age to earn money, possible deafness, and having a family from a rural background.

The student who later became a heavy user of alcohol was most likely male, low on the social desirability trait, and low on conscientiousness, but tending to be enthusiastic. Parents tended not to know what their child was doing and academic achievement was lower than average. The later alcohol user tended to stay up late on weekends, start smoking cigarettes early and heavily, and to join social clubs.

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# PREDICTING HEROIN AND ALCOHOL USAGE AMONG YOUNG PUERTO RICANS [1]

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Longitudinal studies of young people who become users of heroin have been relatively rare. One of the major studies was that of Lloyd Johnston's Youth in Transition Project (1973). More recently Lettieri (1975) has edited a volume on Predicting Adolescent Drug Abuse which brings together much of the current research on this topic. Heroin usage in Puerto Rico has been studied by Garciá and Rosselló (1971) and by Muñoz, Torres, Matanzo, and Vázquez (1971). The present study reports some of the major results from a longitudinal study of substance usage conducted in Puerto Rico (Nuttall, Nuttall, Muñoz, Arbona et al. (1977). This paper reports the results of prediction equations, attempting to predict heroin and alcohol usage of young people from data obtained seven or eight years earlier while they were in secondary school. The goal of this paper is to present a pair of models which would allow the ~~school counselor~~ psychologist to be able to identify students who are at higher risk of later becoming substance users.

Six realms of variables were involved in this research: social background, family relationships, personality, academic variables, health variables, and the sex of the person.

## METHODS

### Sampling Plan

In the spring of 1968 a study was conducted involving 5,300 students then attending secondary schools in the Bayamón Norte School District in the city of Bayamón, Puerto Rico. This study was conducted by the Department of Public Instruction of the Commonwealth of Puerto Rico with Mr. Raúl A. Muñoz, then the Undersecretary of Education for Research and Development, the Project Officer and Dr. Ronald L. Nuttall, the Principal Investigator. This study was concerned with the factors, other than intelligence, which influenced the academic achievements of secondary school students.

In 1975, one thousand of the original 5,300 Puerto Rican adolescents studied in 1968 were selected for an in-depth study of the psycho-social factors related to drug use and abuse. Five hundred of the 1,000 selected for follow-up were systematically selected by taking every tenth name on the homeroom lists. Since these lists were ordered by school, grade, room, and alphabetically by student, the systematic sample was also stratified by these factors.

There were also 500 students selected to be at "high risk" of drug usage. This group was selected as follows. First a "known high risk" group was obtained from examining police files as of 1975 for people who were in the 1968 sample who had an arrest record (96 people). The records of drug treatment centers yielded the names of 31 people in the 1968 data base, and 35 people were found from the records of drug prevention agencies. The Puerto Rican Narcotics and Drug Addiction Division records yielded 17 more names and newspaper articles about drug related arrests yielded five names. After removing duplicate names, this "known high risk" group totaled 162 people.

A second group of "suspected high risk" people was constructed by including people whose names were listed by the school social workers as having had some need for help with social, psychological, educational or financial problems. We also included in this "suspected high risk" group anyone who was a sibling of a person in the "known high risk group". Because of confidentiality, the social workers allowed us to obtain only the names but not the specific difficulties each teenager was having. Anyone qualifying for both the "known high risk" group and the "suspected high risk" group was allocated to the known high risk group. There were 214 people in the suspected high risk group.

Two other groups were then defined, a group of high school graduates (2808) and a group of high school drop-outs (2119). A discriminant function analysis was then conducted, differentiating the four groups. The results of this analysis were reported in Nuttall, Nuttall, Ostermann, Zayas, and Muñoz (1976). The second discriminant function obtained differentiated the "known high risk" and the "suspected high risk" from the other two groups involved. On the first discriminant function the "known high risk" group and the high school drop-outs were contrasted to the high school graduates. Table 1 presents the results of this discriminant function analysis.

These findings indicated that the "known high risk" students tended (in 1968) to have been in lower grades - perhaps not yet having dropped out, had parents who were quite lax in their discipline patterns, spent most of their lives in Bayamón, were tough-minded, tended to have had a father absent from home, had lower levels of education expected, had parents who tended to use considerable hostile psychological control mechanisms, and whose families tended to live in public housing.

For the present study, a sample of 500 "high risk" people was then composed by including in this group the 162 people in the "known high risk" group, the 214 people in the "suspected high risk" group and 124 people who, in the discriminant function analysis, had the highest scores on the classification equations indicating their likely membership in the "known" or "suspected" high risk groups.

Of the 1,000 individuals selected, 657 were actually interviewed. The parents or other relatives of an additional 130 were interviewed when the family could be located even if the target person was unavailable. The major reason for noncompletion of the interviews was the inability to locate the family from the addresses obtained from the school files. Some of these school file addresses were placed in the files when the student entered first grade, more than twelve years ago. About equal numbers of high risk and low risk people were interviewed.

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Insert Table 1 about here.

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Measures

A complete description of the measures used is presented in the report Psycho-Social Precursors of Drug Use in Puerto Rico (Nuttall, Nuttall, Muñoz, Arbona et al., 1977). The substance usage questions were the same as those used by Johnston (1973) in his longitudinal study of American youth.

Statistics

A step-wise multiple regression procedure was used, using the SPSS system (Nie et al.; 1975).

## RESULTS

### Predicting Heroin Usage

The dependent measure was a question which asked the respondent the extent of their usage of heroin with answers ranging from "never" to "nearly every day". A step-wise multiple regression analysis was conducted attempting to predict this heroin usage dependent variable from the 1968 data. (Four questions on family relationship were also asked in 1975 and were included in the model. They were designed to parallel the 1968 measures of the Schaefer CRPBI factors.)

The results are presented in Table 2, indicating that some seventeen percent of the variance in heroin usage was predicted. The major prediction power for heroin usage comes from the academic realm. In particular, patterns of failure, repeating grades, and low grade point averages are danger signals for students who later may develop heroin usage habits. In Table 2, along with the beta weights for the entire model, are the increase in $R^2$ added by each additional variable, and the cumulative total $R^2$ as each variable is added. The increase in $R^2$ can be read as the worth of the new variable when added to a model containing all the previously added variables, while the cumulative total $R^2$ indicates the worth of the total model at any given point. The $R^2$ can be read as the proportion of total variance in the dependent variable accounted for by the model, thus an $R^2$ of .17 indicates that some 17 percent of the total variance in the dependent variable is accounted for by the model.

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Insert Table 2 about here.

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In this table, we have indicated the point at which the F-ratio statistic for adding a new variable to the existing model became less than 2.0. For the analysis reported in Table 2, we used a cut-off value of F = 1.0 to determine when to stop adding new variables. Many statisticians use the F = 2.0 (or even higher values) to determine when to stop.

If we examine only the variables entering into the equation predicting heroin usage in Table 2 above the dashed line, we see a rather clear picture. Academic failure as represented by failing subjects in the tenth grade and repeating elementary school grades together account for over five percent of the variance. Thus academic failure, early and severe, is a major precursor of later usage of heroin.

The next variable to enter was the simple question from the health questionnaire:

"Are you bothered by nervousness?"

_____ Yes, Often

_____ Yes, Sometimes

_____ No, Never.

The direction of the beta weight indicates that it is the student who answers "No, Never" who is more likely to later become a heroin user. This question was unrelated to the usage of alcohol. We think that it is peculiar to heroin usage because using heroin requires (for a heavy user) the injection of the drug into a vein. A person who is bothered by nervousness would simply be less likely to be able to stick a needle into their arm. Hence a mental health or personality trait of nervousness or perhaps squeamishness seems to militate against becoming a heroin user (all other things considered).

The next variable to enter was the one question asked in 1975 as a parallel to the CRPBI factor of lax discipline. Perhaps because it was asked at the same time as the substance usage was collected, it came out in the regression as more powerful than the 1968 CRPBI Lax Discipline factor itself. The question was as follows:

> "In general did your father know about what you were doing and always keep an eye on what you were doing or do you think he did not pay much attention to the things you were doing?"
>
> _____ In general he knew what I was doing
>
> _____ Sometimes he knew what I was doing and sometimes he did not.
>
> _____ He was not paying attention to what I was doing.

The direction of the effect was that the less the father knew what the child was doing, the more likely the child was to later become a user of heroin. What we have here then, is clear evidence that the amount of suprvision given the child, especially by the father, was related to later usage of heroin.

Sarason's (1960) test of anxiety next entered the equation. The direction of the relationship is such that the child who manifests less test anxiety is more likely to later use heroin. Our interpretation of this result is that a moderate amount of anxiety about tests is a good sign, and these students were so low on test anxiety because many of them had already given up on hoping for achievement in school.

The next variable to enter, was the Cattell and Cattell (1969) High School Personality Questionnaire Factor A (Sociability) scale. This personality test consists of ten items, each with a trichotomous response category. The high end of the scale represents Outgoing, warmhearted, easygoing, and participating. The low end of the scale, which is linked to

greater risk of heroin usage, represents being Reserved, detached, critical and cool. A feel for the scale can be gained by one item we specifically developed for the Puerto Rican study.

"If you were to work in a movie theatre, would you rather

_____ be a ticket-taker and talk to the people

_____ uncertain

_____ be the projectionist and run the film?

The last variable to enter above the dashed line in the model was the grade point average as obtained from the school records for the student's entire academic history. The worse the grades, the greater the risk of the child later using heroin.

Below the dashed line, many of the variables are somewhat more confusing since their beta weights are more affected by contrasts and interrelationships among the other variables already in the model. For example the number of subjects failed in the 11th grade has a negative beta weight indicating that the more subjects failed, the less the risk of later using heroin. However this has to really be understood in the context that already included in the model are failure in the 10th and 7th grades. Hence what this variable's beta weight is indicating is that <u>early</u> school failure is considerably worse for heroin usage prediction than is late school failure.

Similarly there are two variables for crowdedness in the home, one relating to the number of people sleeping in your bedroom, and the other indicating the number of people sleeping with you in your bed. The regression beta weights indicate that the <u>fewer</u> people in the room, but the <u>more</u> people in the bed led to greater heroin usage. Uncontrolled here is the size of the bedroom. We feel that we can conclude that children who are so poor that more than one person shares their bed, are at greater risk for later heroin usage.

Children who earned money early were at greater risk, probably again because this is an indication of greater poverty, but perhaps also because earning money early indicates an ability to hustle the streets successfully.

Children from more rural families were at greater risk than were children whose parents had a more metropolitan background. However the child who was born in the city where he grew up (in this case, Bayamón) was more at risk. Perhaps because he or she would know the city so well and could, if necessary, score on drugs more easily than could a newcomer to the city.

The Schaefer CRPBI Lax Discipline Factors for mothers and for fathers have opposite signs, indicating that mother's lax discipline was more important than was father's for leading the child to greater risk. But we know from the question P6Q26 on father knowing what you were doing, that father's lax discipline was also very important.

On the whole then, a procedure for predicting heroin risk should include the following measures:

- Academic Failure Indices (low achievement)
- Nervousness (not nervous)
- Parental lax discipline (parents not aware of what child does)
- Test Anxiety (not anxious)
- Sociability (Reserved, not Outgoing)
- Poverty (poor)
- Earned Money (early age at earning money)
- Rurality (family from rural background)
- Hearing (trouble hearing people talk)

Predicting Alcohol Usage

Alcohol usage was about twice as predictable as was heroin usage, with about 33 percent of the variance of alcohol usage predictable from the 1968 data. Table 3 presents the step-wise regression results for alcohol usage.

The most important single variable for alcohol usage was the gender of the person. Males had much higher rates of alcohol usage than did females. The first order correlation between sex and alcohol usage was .40, and when entered into the equation first, gender accounted for about sixteen percent of the total variance. Thus of the total model, which accounted for 33 percent of the variance, about half of this could be allocated to the gender of the person.

The second variable to enter was the Children's Social Desirability Score, with the direction of the beta weight indicating that the children who as young adults became heavy drinkers, tended to be less concerned with appearing in a socially desirable light seven years earlier. The first order correlation is -.12 while the beta weight in the final model is only -.05. This indicates that other variables in the final model share much of the variance which was caught in the social desirability dimension.

Several family variables were important in predicting alcohol usage; in particular the heavy drinkers tended to have mothers whom they felt loved them a lot and who tended to give them very little discipline. The mothers of the heavy drinkers were also more likely to have worked outside the home when the children were very young.

School failure was not as important in predicting alcohol usage as for predicting heroin usage, but heavy drinkers did tend to have lower grades than did the later non-drinkers and to have failed more subjects. The later heavy drinkers were less likely to say that they liked school

enough to want to continue their education. On the other hand, controlling for other factors, the later heavy drinkers tended to do somewhat better than average on the SAT type achievement tests. Thus while grades and aspirations were down, tested knowledge was somewhat up for the later heavy drinkers.

The heavy drinkers tended to have started smoking at an early age and to have been heavy smokers. They also were quite likely to stay up late on weekends. Ther were more likely than light drinkers to be members of clubs.

In terms of their personality, as has been mentioned, the heavy drinkers tended to have been as children less concerned with presenting a socially desirable image of themselves. They also tended to be less conscientious than were the light drinkers and to have been more enthusiastic.

Several health variables were involved in differentiating children who later became heavy rather than light drinkers. The heavy drinkers tended to say that they had trouble hearing people talk, they did not have pills or medicines prescribed for them, but they were more likely to have to use a physically corrective appliance (such as a shoulder brace), and had more frequent indigestion or stomach trouble.

The economic status of the family was not much related to predicting alcohol usage, but the children who later became heavy drinkers were more likely to say that their families had higher financial status. They were also more likely to have lived in relatively few different homes.

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Insert Table 3 about here.

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The factors leading predicting later heavy drinking behavior can be summarized as follows.

| | | |
|---|---|---|
| o | gender | (males more) |
| o | personality | (low on Social Desirability) |
| | | (low on Conscientiousness) |
| | | (high on Enthusiasm) |
| o | parent-child | (father did not know what the child was doing) |
| | | (mother did not know what the child was doing) |
| | | (mother high on Lax Discipline) |
| | | (mother worked when child was small) |
| o | academic | (low grades in high school, good grades in elementary |
| | | (several failures in subjects) |
| | | (somewhat higher achievement test scores) |
| | | (less interest in further studies) |
| o | behavior | (stays up late on weekends) |
| | | (started smoking early) |
| | | (smoked heavily) |
| | | (number of social clubs) |
| o | financial | (somewhat higher family financial status) |
| o | health | (no trouble hearing people talk) |
| | | (no prescribed pills or medicines) |
| | | (has used corrective braces or appliances) |
| | | (tends to have indigestion or stomach trouble) |
| o | mobility | (has lived in few houses) |

## DISCUSSION

This study has indicated that the precursors of heroin usage tend to be quite different from those of alcohol usage. In both cases, lower academic achievement and less supervision by the parents are associated with greater substance usage. However the academic failure is a very powerful aspect of the heroin involvement, while only a minor aspect of the heavy drinker picture. Indeed the future heavy drinker, while having poor grades and less interest in further education, tends to actually have slightly higher tested knowledge of school subjects.

The heavy alcohol consumption fits into a culturally accepted norm of Puerto Rican society, with males expected to be able to and to enjoy heavy drinking. Associated with this cultural pattern is slight interest in school, and not especially high grades. Moreover, the behavior patterns of early and heavy smoking, staying up late on weekends, also fits this cultural pattern. These people are enthusiastic and not very conscientious, and do not care too much what others think of them.

Poverty is not a part of the alcohol usage picture, while it is for the heroin users. The later alcohol users tend, if anything, to be above average financially, while the heroin users seem to come from very poor family backgrounds, with parents from rural parts of the island and many now living in public housing developments.

These pictures indicate somewhat different types of people tend to turn to these different substances, with different prognoses and different causal patterns.

Table 1

Discriminant Function Analysis Separating Four Groups of Puerto Rican Adolescents

| Variables | Standardized Weights Function 1 | Function 2 |
|---|---|---|
| **School Related** | | |
| Grade Level Achieved (1968) | .86 | -.25 |
| Amount of Education Hoped For | .06 | .33 |
| **Family Related** | | |
| Hostile Psychological Control | -.10 | -.40 |
| Lax Discipline | -.07 | -.45 |
| Father home first seven years | -.17 | .08 |
| **Personality Related** | | |
| HSPQ Factor I - Tenderminded | .10 | .37 |
| **Social Conditions Related** | | |
| Lived in family owned home vs. lived in housing project | -.12 | .13 |
| Time in present community | .21 | -.24 |

| Groups | Means on Discriminant Functions Function 1 | Function 2 |
|---|---|---|
| "Known high risk group" | -.48 | -.57 |
| "suspected high risk group" | -.05 | -.47 |
| High School Dropouts | -.53 | .06 |
| High School Graduates | .35 | .02 |

Table 2

Stepwise Regression Results Predicting Heroin Usage

| Variables Stepped In | Cumulative $R^2$ | Increase in $R^2$ | Beta Weight | Simple r |
|---|---|---|---|---|
| No. Subjects Failed in 10th Grade | .039 | .039 | .23 | .20 |
| Number of Grades repeated | .052 | .013 | .16 | .15 |
| Are you bothered by nervousness? | .066 | .014 | -.10 | -.10 |
| P6Q26 Father knew what you were doing? | .077 | .011 | -.10 | -.10 |
| Sarason's Test Anxiety | .085 | .008 | -.09 | -.10 |
| HSPQ Factor A (Sociability) | .093 | .008 | -.15 | -.08 |
| Grade Point Average 12th Grade | .100 | .007 | -.12 | -.05 |
| No. Subjects Failed 7th Grade | .107 | .007 | .14 | .11 |
| No. Subjects Failed 11th Grade | .113 | .006 | -.11 | .04 |
| Number of people sleeping in bedroom | .118 | .005 | -.13 | -.05 |
| Number of people sleeping in your bed | .129 | .011 | .12 | .06 |
| Age earned first money | .134 | .005 | -.09 | -.02 |
| Urbanicity of Father's Community of Origin | .139 | .005 | -.08 | -.08 |
| Father's CRPBI Lax Discipline Factor | .145 | .006 | -.16 | -.03 |
| Mother's CRPBI Lax Discipline Factor | .152 | .007 | .11 | .06 |
| Trouble hearing people talk | .156 | .004 | .08 | .07 |
| After high school intends full-time college | .160 | .004 | -.07 | -.01 |
| P6Q28 You were your father's preferred child | .164 | .004 | .07 | .01 |
| HSPQ Introversion-Extroversion Factor | .168 | .004 | .08 | .01 |
| Time in present community | .172 | .004 | .06 | .04 |

Note. The dashed line indicates where the F-value for entering variables fell below 2.0.

Table 3

Stepwise Regression Results Predicting Alcohol Usage

| Variables Stepped In | Cumulative $R^2$ | Increase in $R^2$ | Beta Weight | Simple r |
|---|---|---|---|---|
| Male Gender | .157 | .157 | .30 | .40 |
| Social Desirability Scale | .177 | .020 | -.05 | -.21 |
| Years Mother Worked Outside Home | .190 | .012 | .08 | .13 |
| P5Q22 Mother knew what you were doing | .202 | .012 | -.09 | -.14 |
| Trouble hearing people talk | .214 | .012 | -.10 | -.04 |
| HSPQ Factor G (Conscientiousness) | .22 | .009 | -.08 | -.24 |
| Medicine or pills prescribed by doctor? | .231 | .008 | -.10 | -.15 |
| Mother's CRPBI Lax Discipline Scale | .240 | .009 | .09 | .17 |
| Grade Point Average 12th Grade | .249 | .009 | -.14 | -.11 |
| P5Q21 Mother loved you | .257 | .008 | .07 | .05 |
| Used corrective appliance (shoulder brace) | .265 | .008 | .09 | .08 |
| Mean Score SAT-type Achievement Tests | .273 | .008 | .08 | .07 |
| Higher Family Financial Status | .279 | .006 | .08 | .12 |
| Grade Point Average 9th Grade | .283 | .005 | .07 | .05 |
| No. Subjects Failed 11th Grade | .288 | .005 | .09 | .12 |
| Frequent stomach trouble or indigestion | .293 | .004 | .07 | .07 |
| Required to avoid physical exertion? | .297 | .005 | -.07 | -.09 |
| Stays up late on weekends | .302 | .004 | .10 | .18 |
| No. Cigarettes smoked weekly in 1968 | .307 | .006 | .21 | .06 |
| Length of time smoking | .315 | .008 | .15 | .14 |
| Likes School, plans to continue studies | .320 | .005 | -.08 | -.12 |
| HSPQ Factor F (Enthusiasm) | .325 | .005 | .09 | .21 |
| Number of different homes lived in | .329 | .004 | -.07 | -.01 |
| P6Q26 Father knew what you were doing | .333 | .004 | -.07 | -.13 |
| Member other clubs | .336 | .003 | -.06 | -.06 |

Note. The dashed line indicates the point in the step-wise regression where the new variables added failed to have an F-ration of greater than 2.0

## NOTES

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